

Fracture Behaviors of Additive Manufactured Alloys

Completed Technology Project (2016 - 2017)



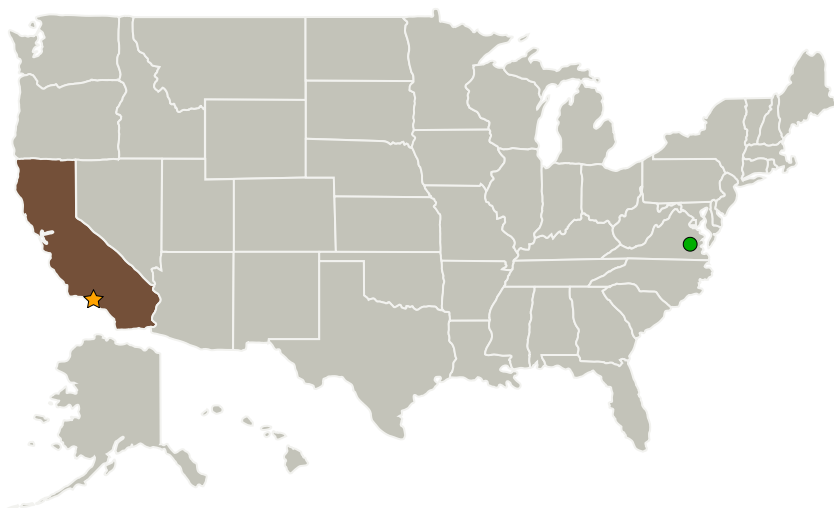
Project Introduction

Advanced fracture mechanics behavior, especially at depressed, cryogenic temperatures has not been reported in the literature nor is it being pursued in current open efforts. A variety of alloy systems have issues when processed via additive manufacturing, if careful attention isn't paid. The nature of the processing, which is akin to millions of microwelds in a complex/re-heating environment, can cause the formation of deleterious secondary phases or alter the grain boundary chemistry/morphology. The simplest and best way to evaluate any susceptibility is to perform testing under the worst conditions that it will see, which for JPL's purposes, is cryogenic fatigue loading of Ti-6Al-4V.

Anticipated Benefits

Study the effects of processing conditions on the second-order materials behaviors (e.g., fracture toughness, fatigue crack growth) in additively manufactured alloys.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	2
Target Destination	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Innovation Fund: JPL CIF

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
CalRAM Inc	Supporting Organization	Industry	
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

California

Project Management

Program Director:

Michael R Lapointe

Program Manager:

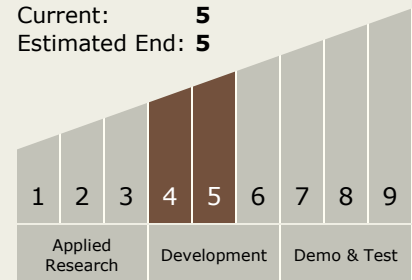
Fred Y Hadaegh

Principal Investigator:

Bryan Mcenerney

Technology Maturity (TRL)

Start: 4
 Current: 5
 Estimated End: 5



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - TX12.1 Materials
 - TX12.1.8 Smart Materials

Target Destination

Foundational Knowledge